MAY 10 1924

SCIENCE

NEW SERIES
VOL. LIX, NO. 1532

FRIDAY, MAY 9, 1924

ANNUAL SUBSCRIPTION, $6.00
SINGLE COPIES, 15 CTS.

11th EDITION, NOW READY

Bloxam's Chemistry Organic and Inorganic

With Experiments. 11th Edition. 310 Illustrations.
8vo. Cloth, $9.00.

By CHARLES L. BLOXAM. Revised by Arthur G. Bloxam, F.I.C., and S. J. Lewis, D.Sc., F.I.C., (Eng.).

The fact that the whole subject is dealt with in a single volume is one reason why the book has been so popular throughout the English-speaking world. Room has been found for short accounts of present views on the structure of the atom, the quantum theory, crystal structure, etc., while certain existing matter, such as the section on spectroscopy, has been rewritten and expanded.

The volume contains matter much in excess of that in the previous edition, nevertheless its bulk has been somewhat reduced.

Contents in Brief: Introduction; Water; Air; Acids; Bases; Salts; Hydrogen; Halogen Group; Sulphur Group; Phosphorus Group; Carbon and Boron Groups; Argon Group; General Principles and Physical Chemistry; Chemistry of the Metals; Alkali Metal Group; Alkaline Earth Metal Group; Magnesium Group; Aluminum Group; Iron Group; Chromium Group; Antimony Group; Tin Group; Copper, Silver, Gold, Eighth Group; Organic Chemistry; Hydrocarbons; Alcohols, Aldehydes, Acids; Stereo-Chemistry; Ketones, Ethers, Halogen Derivatives, Esters; Metal and Metalloid Derivatives; Ammonia Derivatives; Cyanogen and Its Compounds; Phenols; Quinones; Carbohydrates; Glucosides; Proteins; Heterocyclic Compounds; Index.

"It is refreshing to observe its mass of most interesting facts—real chemical information."—**Journal American Chemical Society.**

"The chapter including a discussion of fluorescence and phosphorescence constitutes a valuable repository of reference material along this line of scientific investigation. Apparatus, graphs, crystalline forms, etc., are all neatly illustrated. The index is exceptionally complete with an exhaustive cross index scheme. The volume is assuredly a valuable contribution to both technical reference and text literature and maintains, if not excels, its original purpose, which has in past years secured the confidence that has hitherto been deservedly bestowed, both in this country and abroad."—**Journal of the American Pharmaceutical Association.**

"The revision has been wisely and thoroughly done, and the book is one which will be found more useful for reference purposes. . . . It covers the whole of chemistry in an interesting manner, and the descriptions of experiments are especially noteworthy. Many of these were new to the reviewer."—**Nature.**

"We are impressed with the simplicity of the volume and with its accuracy."—**The Lancet, London.**

P. BLAKISTON'S SON & CO.

Publishers 1012 Walnut Street, Philadelphia

Some Wiley Texts in Chemistry

JUST PUBLISHED **Sixth Edition, Completely Revised**

Quantitative Analysis

By the late F. P. TREADWELL, Ph.D., formerly Professor of Analytical Chemistry in the Polytechnic Institute of Zurich. Translated, Enlarged and Revised by WILLIAM T. HALL, S.B., Associate Professor of Analytical Chemistry, Massachusetts Institute of Technology.

One teacher of the subject welcomes this new edition as "the best book on quantitative analysis in any language."

Although the methods are, in the main, the same as those described in the tenth edition of the German text, about twenty per cent. of the book has been altered to conform to the best American practice. This is true, particularly with regard to standards of mass and volume.

811 pages. 6 by 9. 152 figures. Cloth, $5.00.

CHARTS OF THE CHEMICAL REACTIONS OF THE COMMON ELEMENTS

By JOHN A. TIMM, Ph.D., Instructor in Chemistry, Yale University.

A series of charts for use in reviewing the chemical reactions of the more common elements. The important facts about each element are presented in a concise and easily understood manner for both the student and chemist.

81 pages. 7⅛ by 9½. Cloth, $2.00.

A TEXT-BOOK OF INORGANIC CHEMISTRY

Sixth English Edition, Revised.

By A. F. HOLLEMAN, Ph.D., LL.D., F.R.A.Amst., Issued in English in Cooperation with HERMAN CHARLES COOPER.

An exceptionally complete text covering the entire subject of Inorganic Chemistry. The sixth edition embodies many discoveries made in researches during and immediately following the recent war.

528 pages. 6 by 9. 80 figures. 1 folding chart. Cloth, $3.50.

A LABORATORY MANUAL OF INORGANIC CHEMISTRY

Second Edition, Revised.

By JOHN B. EKELEY, Ph.D., Sc.D. (To accompany "A Text-Book of Inorganic Chemistry," by Professor A. F. HOLLEMAN.)

225 pages, each page printed with reverse side blank for note-making. 5 by 7¼. 46 figures. Cloth, $1.50.

SECOND YEAR COLLEGE CHEMISTRY

(With Laboratory Manual)

By WILLIAM H. CHAPIN, Ph.D., Oberlin College.

The text first restates the general principles in their simplest form and then extends the development of these principles in a more exact and quantitative way.

The Laboratory Manual follows the same method and is almost entirely quantitative.

Text: 311 pages. 6 by 9. 44 figures. Cloth, $3.00.
Laboratory Manual: 121 pages. 6 by 9. Cloth, $1.50.

GENERAL CHEMISTRY

An Elementary Survey, Emphasizing Industrial Applications of Fundamental Principles.

By H. G. DEMING, Ph.D., Professor of Chemistry, University of Nebraska.

The ideal text for every student of General Chemistry. Just adopted in another university, making a total of forty-one adoptions to date, with many more in prospect.

605 pages. 6 by 9. 128 figures. Cloth, $3.50.

EXERCISES IN GENERAL CHEMISTRY

By H. G. DEMING, Ph.D., and SAUL B. ARENSON, Ph.C., A.M.

In Press. Ready about July 1st.

A laboratory manual prepared to accompany Dr. Deming's text. Designed also to stand on its own merits as an independent work.

AN ADVANCED COURSE IN QUANTITATIVE ANALYSIS

Second Edition, Revised

By HENRY FAY, Ph.D., D.Sc., Professor of Analytical Chemistry and Metallography, Massachusetts Institute of Technology.

Intended for students who have had an elementary training in quantitative analysis. The material offered is chosen to illustrate principles and train the student in their manipulation.

115 pages. 6 by 9. Illustrated. Cloth, $1.50.

QUALITATIVE ORGANIC ANALYSIS

By OLIVER KAMM, Director of Chemical Research, Parke, Davis and Company; formerly Assistant Professor of Chemistry, The University of Illinois.

An elementary, introductory course which forms a groundwork for the more specialized lines of advanced organic analysis.

260 pages. 6 by 9. 12 figures. Cloth, $2.50.

Send for any Wiley Book for examination

John Wiley & Sons, Inc.

440 Fourth Ave. **New York**

SCIENCE

VOL. LIX MAY 9, 1924 No. 1532

CONTENTS

The National Academy of Sciences: Addresses given on the Occasion of the Dedication of the Building for the National Academy of Sciences and the National Research Council, Washington, April 28, 1924; The President of the United States; Dr. John C. Merriam; Dr. Vernon Kellogg; Dr. Gano Dunn 405

The History of the American Association: PROFESSOR HERMAN L. FAIRCHILD 410

Ernest Fox Nichols: PROFESSOR AUGUSTUS TROWBRIDGE 415

Scientific Events: Resolutions in Memory of John M. Stillman; Expedition to Mexico of the National Geographic Society; Activities of the Rockefeller Foundation; The Pennsylvania Academy of Science; John Scott Medal Awards 416

Scientific Notes and News 418

University and Educational Notes 422

Discussion and Correspondence: The Spectrum of Helium in the Extreme Ultra-violet: PROFESSOR THEODORE LYMAN. *Portraits of Naturalists:* DR. L. O. HOWARD. *Frank H. Bigelow:* DR. HARVEY W. WILEY 422

Scientific Books: Campbell on Galvano-magnetic and Thermo-magnetic Effects: PROFESSOR WM. S. FRANKLIN 423

Special Articles: The Somatic Chromosomes of the Chick and their Possible Sex Relations: DR. ROBERT T. HANCE 424

The Washington Meeting of the American Chemical Society 425

Science News x

SCIENCE: A Weekly Journal devoted to the Advancement of Science, edited by J. McKeen Cattell and published every Friday by

THE SCIENCE PRESS

Lancaster, Pa. Garrison, N. Y.

New York City: Grand Central Terminal.

Annual Subscription, $6.00. Single Copies, 15 Cts.

SCIENCE is the official organ of the American Association for the Advancement of Science. Information regarding membership in the association may be secured from the office of the permanent secretary, in the Smithsonian Institution Building, Washington, D. C.

Entered as second-class matter July 18, 1923, at the Post Office at Lancaster, Pa., under the Act of March 3, 1879.

THE NATIONAL ACADEMY OF SCIENCES

Addresses given on the occasion of the dedication of the building for the National Academy of Sciences and the National Research Council, Washington, April 28, 1924

THE PRESIDENT OF THE UNITED STATES:

IF there be one thing in which America is pre-eminent, it is a disposition to follow the truth. It is this sentiment which characterized the voyage of Columbus. It was the moving impulse of those who were the leaders in the early settlement of our country, and has been followed in the great decisions of the nation through all its history. Sometimes this has been represented by political action, sometimes by scientific achievements. On this occasion, the emphasis is on the side of science.

By science I mean the careful assembling of facts, their comparison and interpretation. Of those who are entitled to high rank in both our political and scientific life, perhaps Benjamin Franklin was the earliest and one of the most conspicuous examples. But it is the same spirit that has moved through all our life, which makes it particularly appropriate that our national government should be active in its encouragement of the searching out of the truth in the physical world, and applying it to the wellbeing of the people, as it is interested in the searching out of the truth in the political world with the same object in view.

President Washington, in his farewell address to the American people said: "Promote, then, as an object of primary importance, institutions for the general diffusion of knowledge. In proportion as the structure of a government gives force to public opinions it should be enlightened." It was the first President of the United States who saw the necessity of research in this country. Jefferson, our third President, was himself a research worker by natural gift, and loved the problems which gave him a broader knowledge of our natural surroundings. The beginning of our government, therefore, had to do with the inception of scientific research in the United States.

American science may be divided into five periods —the Jefferson period, that of Silliman, the Agassiz period, the present period of cooperative research when no one dominates, and the future for which definite foundations are being laid.

The Jefferson period began even before Jefferson's term as President. Paleontology in the United States had its beginning in the publication in 1797 of Jefferson's paper on the Megalonyx or great claw. The first large paleontological laboratory in this country was in the East Room of the White House, where Jefferson arranged his fossils for study.

The Silliman period covers largely the first half of the last century. During this time the National Institution for the Promotion of Science and Art was established in the nation's capital, which promised to be a rival to the American Philosophical Society in Philadelphia. Meanwhile the American Association was started. Also, in this period, an ex-President of the United States was concerned in the founding of an institution for research. John Quincy Adams in his own handwriting amended the bill to establish the Smithsonian Institution, giving it the broad scope which it has to-day.

The third period, that of Agassiz, again brings a President forward in the promotion of science. Abraham Lincoln, deeply interested in the welfare of the American people, confessed that up to the time when he became President and talked with Joseph Henry, then head of the Smithsonian Institution, he was inclined to view the institution as a rather useless government luxury, but, he said, "It must be a grand school, if it produces such thinkers as he." Later on in 1864, when the very foundations of the nation were shaken with Civil War, the same President looked from the Executive Mansion on the Smithsonian Building which was burning, and remarked to some military gentleman present: "Gentlemen, beyond is a national calamity. We have no time to think about it now; we must attend to other things." It was in these days of strife that a senator from Massachusetts, Henry Wilson, later vice-president, put through the two houses of Congress a bill incorporating the National Academy of Sciences in the United States of America. President Lincoln signed this bill. Just how much the war influenced the recognition of necessity for such a body is not known, but war problems were assigned to the academy and acted on. Since then many government scientific questions have been referred to it by the President, members of the cabinet, and committees of Congress, and the academy members have lent themselves to the work of solving these problems, knowing that their only compensation would be the knowledge that they had served the government of the United States to the best of their ability.

The period of individual work in science continued in America up to the time of the world war. Then a change came over the established methods of warfare. Instead of individual fighting individual, it was masses against masses. Scientific problems in research for the solution of war matters could not, therefore, be solved by one man, but must be worked out by those interested in the same field. Realizing this fact, and knowing of the many experts in the various fields of science covered by the academy, a request was made to President Wilson by the academy to call the leading scientific men of America for service under the guidance of the National Academy of Sciences and to organize a body to solve problems which required cooperative research. Thus began the National Research Council, and later the Council of National Defense requested it to act as the department of research of that body. After the armistice was signed the President of the United States, appreciating the value of what had been done, requested the National Academy of Sciences to reorganize the National Research Council under its charter on a permanent peace basis, and with this request cooperation in scientific research was given a firm foundation. Upon the assumption of this added responsibility, it was found that the old quarters of the academy at the Smithsonian Institution were not adequate. A number of philanthropists who recognized what splendid work could be done if ample space and facilities were available, contributed a sum sufficient to secure the lot on B Street, between 21st and 22d, and C Streets. The Carnegie Corporation of New York then donated the building, which may be termed the Temple of Science in America. It is not a place of mystery, but one to lead the public in thinking deeply and seeing how research can explain fundamental problems.

Nothing with more promise than the fifth period, that of the future of American science, could come to the American people. The scientific man is rending the earth to reveal its secrets. Truth must prevail for the betterment of mankind, and with the energy that the men of science are putting into the problems of research, Diogenes would certainly have a chance to lay down his quarter-staff and lantern and rest, if he would turn his search in their direction.

This magnificent building now being dedicated to science predicts a new day in scientific research. A new sun is rising. It is destined to illuminate the scientific world by illuminating this hall.

One of the most important possibilities for service of the National Academy of Sciences in the future lies in its opportunity for inspiring the people of America to insistence upon having the truth, and nothing but the truth, regarding everything that touches our life as a nation. It is always to be borne in mind that while the peculiar relation of the academy to the government of the United States may concern the conduct of specific researches, the ex-

ample of dignified emphasis upon the truth as reached by correct thinking in every department of research, and in its practical applications, may be a contribution of inestimable value to the whole people.

It is for this purpose that the government sets its stamp of approval upon this effort, and joins in dedicating this building to the betterment of the human race by achieving a clearer knowledge of the truth.

DR. JOHN C. MERRIAM, VICE-PRESIDENT OF THE NATIONAL ACADEMY OF SCIENCES, PRESIDENT OF THE CARNEGIE INSTITUTION, WASHINGTON:

IN the midst of distractions incident to the great national struggle in progress in 1863, the Thirty-seventh Congress of the United States gave evidence of its vision in many exceptional ways. It opened the great west to settlement by homestead, and authorized construction of a railway to connect the Atlantic with the Pacific. It was through the unanimous approval of this congress and the approval of President Lincoln that the National Academy of Sciences received its charter. Though the founding of the academy was in a measure planned with the idea of strengthening the national defense, it was clearly the purpose to reach beyond necessities of the moment and to consider the importance of advancing knowledge and its application for future benefit to the nation.

When the incorporators of the academy were called together, Senator Wilson, of Massachusetts, in transmitting the commission from the government, stated that while some had thought the time not well chosen for such action by Congress, he wished to have the world realize that "the statesmen and the people of the United States in calm confidence . . . are fostering the elevating, and purifying and consolidating institutions of religion, benevolence, literature, art and science."

It soon became clear that if the academy was to serve the government fully in the rôle planned, there must be opportunity for better organization and better contacts, first among its members, then with other organizations, with the public, directly with the agencies of our own government, and with scientific bodies of other countries. It was evident that this must come through developing machinery which could be set up only if permanent quarters were available in the Capital City and in close relation to the agencies of the Federal Government.

The ceremonies in which we participate to-day bring to us, in what seems like sudden fruition, the results of the vision, the plans and the hopes of many years. Knowing as we do that the joy in recognizing advance is itself essential to progress, this would seem the natural time to halt for a moment of pure pleasure in contemplating the attainment. But more important to us than mere apreciation of accomplishment is the realization that this is also a time at which we should consider with utmost care what these newly established conditions mean in terms of further opportunity. We must not fail to realize that these pleasures of possession have intimate relation to responsibility for that which we have helped create, as also for the new and great possibilities of service now opened.

So while this is first a day of rejoicing that possessions have been secured and ideals have been realized, it is most of all a time for earnest consideration of the gerat things this advance may mean for the academy and for the people of to-morrow.

In viewing the future responsibilities of the academy to the government, we may not interpret this relation to mean merely the possibility of assistance in specific problems or researches as they may happen to arise, either in relation to national defense or in other connections. There can be no doubt that this body was chartered with the understanding that it would have always in mind the interests of the people in whatever ways science can contribute to meet their needs or support their ideals. Though it is clear that the academy represents expert knowledge in the sciences only, it is important that its vision of ultimate service reach over all phases of the nation's life and thought, ranging from defense to assistance in securing those guarantees of comfort and health in body and spirit which make good citizenship and happiness possible.

Now, for the first time, we are to have a home, with all that this means as a place to live and work. It seems clear that as one of its responsibilities the academy with its relatively small membership, comprising all the sciences, should look forward to its general and special meetings here as exceptional opportunities for bringing the whole range of scientific inquiry to bear upon new discoveries or upon great investigations in progress. Even more important than the general meetings will be the possibilities of those frequent intimate conferences of small groups brought together for discussion of special topics, in which, with a minimum of formality, the more fundamental discussion is made possible.

The bringing of the National Research Council into being on the foundation of the academy charter has extended greatly the possibilities for stimulation and organization of research. In occupying its quarters in the new building, the academy will come into a relation to the council which will bring out more clearly than at any earlier time the significance of the organization which it has brought into existence. The invitation to a large group of the national scientific societies of this country to participate in the work done through the Research Council has developed a

wide range of relationships of the greatest importance. The responsibilties and opportunities which present themselves to the academy in connection with future problems of the Research Council must be reckoned as among the most important which will now come closely to our vision.

In the future development of our foreign relations in scientific work appears also one of the very great opportunities for national service. There is good reason for believing that the possibility of some of the surest ties to be formed between the nations lies in the discussion of scientific and intellectual questions in which international cooperation is directed specifically toward search for the truth without reference to its immediate economic or political bearing.

Along with those relationships of the academy which have been considered, there is also open to this body, as to other scientific agencies, an exceptional opportunity and a responsibility for aiding to steady the thought of the people by interpreting in some measure the meaning of the rapid advances now being made in scientific understanding of man and his environment. With the continuing growth of knowledge we see the universe increase in complexity and extend itself vastly in space and time. It is to be expected that adjustments in our scientific data will bring into continuous review much that pertains also to the fundamental philosophic and religious thought forming so important a part of the world's thinking. We should never blind ourselves to the fact that the people have philosophies, and always will have them, and that consciously or subconsciously they have religious beliefs also. Abundant national disasters, some of which we have seen in recent decades, have demonstrated fully that there is nothing more deadly than bad national philosophy, especially if it translate itself into terms of economic or political policy. Such beliefs never arise from attainment of the truth, but always from the lack of it.

The academy will always be conservative in holding fast such knowledge as may seem securely founded, but it will never look with favor on the defense of any view merely because it has been held. The attitude of the academy as representing truth-seeking and truth-accepting should have a continuous influence in stabilizing thought. Though we may never be advocates of philosophic or religious systems, we should assist in that interpretation of the shifting panorama which the world seems to present when viewed through the eyes of science. And we should help to keep false assumptions from serving in the place of truth.

DR. VERNON KELLOGG, PERMANENT SECRETARY OF NATIONAL RESEARCH COUNCIL:

IN the presence of the mother, the child lifts only a modest head. The National Research Council was born of the National Academy of Sciences in strenuous days of war, even as the academy itself was born during the throes of an earlier great conflict. Both came into existence for a first purpose of bringing science effectively to the aid of the nation in a time of terrible emergency. Science, which has been said to know no political boundaries, yet has its nationalistic phase. Scientific men may also be patriots.

The academy and the Research Council did so well aid the nation in this war emergency that the President of the United States asked the academy, in 1918, to perpetuate the council as a permanent peace-time organization for the encouragement and support of scientific research in America. This perpetuation was effected, and the council has been steadily and expandingly at work as such an organization ever since the close of the great war.

I shall not weary you with any list of the council's present activities or methods of work. They are many and various, but all follow the lines indicated in the President's order. Nor shall I make any boast of the council's achievements. Boasting will not add to them nor will absence of boasting take anything away from them. I may say simply that we believe that the council has already made achievements helpful to the advancement of science and useful to the nation.

Because of the rôle played by science during the great war, and the even more important rôle that it will inevitably play in the next great war—if such war must come—various philosophers and humanitarians have lifted their voices to decry science as an agent of evil and a promoter of human capacity to do grievous things. They charge against it not only its rôle in war, but its rôle in the industrial revolution which has made too many men slaves of machines.

It is true that science has been used to do sad work. It is true that science can be used to make of the next war an earthly horror almost beyond conception. But is science to be held responsible if we choose to have war rather than peace? Let us put the responsibility where it justly falls: on governments and on ourselves. Because science can convert, in a day or two, a factory for the production of beautiful dyes, pleasant perfumes and disease-destroying drugs into a factory for the production of high explosives and poisonous gases, is science to be judged an enemy of humanity? Scientific men will never make this conversion unless you ask them to. They hope from their hearts that they will never again have to do this.

It is the other side of the picture that science prefers to have shown. It asks to have recognized the many contributions it has made to the well-being

and happiness of mankind. It calls attention to its steady endeavor to satisfy the insistent demand of man to know the world he lives in, that he may more comfortably and confidently live in it; to know the wide reaches of the universe that his mind and soul may understand humility and yet know exaltation. Science moves with constant acceleration in its work of increasing human knowledge, adding to human capacity and expanding human existence. By the very cumulation of knowledge more knowledge is made more rapidly possible. In the early days of prehistoric man before picture-making and writing, man could not cumulate knowledge or, at best, but slightly and slowly. But with the perfecting of means to communicate knowledge from one group to another and from one generation to another the advance and cumulation of knowledge can and do proceed rapidly and ever more rapidly. In the present quarter century more knowledge of the order of nature has been gained than in any quarter century before. One can not dream too widely of the possibilities of the future.

Let science, then, with all encouragement, play undisturbed its glorious rôle of bettering the lot of individuals, adding to the resources of nations, and widening man's understanding of nature and of himself. Let it go on in its great beneficences: conquering disease; ameliorating the wearing struggle for food and the cruel rigors of cold and heat; annihilating distance; reaping benefits from the oceans and forests, and bringing plants and animals to the service of man's sustenance and comfort. Let it continue to convert astrology into astronomy, alchemy into chemistry, guesswork into exact knowing. Let it use imagination to the limit—imagination is no less necessary to science than to the seven arts—but let its dreams be tested by the light of day. Let it prove all things, discover truth, and teach truth and the way of its discovery. Let it attend, undistractedly and unwearyingly, to its great effort to make our land a better land for our children and our children's children to live in, and the human future broader and better than the human present.

To try to help do these things is the avowed purpose of the National Research Council. On this epochal day in its mere youth it rededicates itself to this purpose. For the increase of science and the better understanding and use of science it is now working and will ever work. May the beauty of this new house of science be a symbol of the splendor of scientific achievement yet to come. May America bless itself and the world by the devotion and the genius of its searchers for the truth.

DR. GANO DUNN, CHAIRMAN OF THE BUILDING COMMITTEE:

ON behalf of a devoted Building Committee, Paul Brockett, secretary, which for two years has endeavored to interpret the needs of the National Academy of Sciences and the National Research Council to an architect of the power and genius of Bertram Grosvenor Goodhue, and his associated artists, to a building contractor of the honesty and effectiveness of Charles T. Wills & Company and his subcontractors, and to the building authorities of the District of Columbia, in an atmosphere, here in Washington pregnant with the scientific traditions surrounding the Smithsonian Institution, Abraham Lincoln, Joseph Henry, Dallas Bache, Louis Agassiz, Samuel Langley, I have now in the presence of Abraham Lincoln's successor, the honor to turn over to you as their creation this ineffably beautiful building.

The land on which it stands was purchased by the National Academy of Sciences for $185,000 raised by subscription. The building has cost about $1,450,000. This cost together with the income from the building's maintenance and for the operations of that daughter of the National Academy of Sciences, the National Research Council, come from the generous gift to the National Academy of Sciences of $5,000,000 by the Carnegie Corporation, to aid in the realization of one of the ideals of the life of Andrew Carnegie—the harnessing of science to lift the burdens and improve the conditions of all the people of the United States.

Ever since the time when as Albert Herter has so beautifully painted before your eyes, Prometheus as Science guided by Minerva as Wisdom stole the Divine Fire from the Chariot of the Sun, that Divine Fire has been burning in the minds of men.

This building is one of its altars. The Sun, by a faithful heliostat which daily follows his career across the sky, himself comes down through the eye of the great dome above us, and on a circular table registers in the exact center of this auditorium an image of his flaming personality, revealing to multitudes which prophecy sees entering these doors, his spots and other mysteries not seen by men until Galileo's eyes discovered them to a startled church and an incredulous world.

His rays sifted into a six-foot rainbow below the floor after passing through a slit in the table, reveal to public inspection, through a downward pointing telescope, those secrets of the solar physics and chemistry which modern spectroscopy so proudly displays.

The heavy pendulum which you see suspended from the dome makes languid oscillations in any given plane; but almost while we look, the plane begins to change. It is not really the plane which changes but the position of the earth under it. Our building and the earth itself have squirmed around, thereby proving, as Foucault demonstrated, the earth's diurnal rotation.

These vaulted walls so beautiful do not resound as would a medieval church with voice confusing re-

verberations. They are an artificial stone contributing to optimum acoustics and are so calculated that they absorb enough and yet reflect enough to render clear over all this auditorium a speaker's every word.

Perhaps the larger part of this assemblage can even hear a pin drop when from uplifted hand I release one, as I now do.

Surrounding rooms have been provided in which to exhibit in working actuality with constantly changing program, not what science has done in the past, but currently is doing always the latest wonders about which the public seeks to learn.

The difficult foundations in an ancient stream bed and other triumphs of construction might be enumerated but the occasion does not permit.

Here at their best, lighting, heating, ventilation, intercommunication and other cunning arts of to-day's Prometheus, have effected their compromise with beauty—perhaps it might be better said, have given her a background on which she stands uncompromised.

Upon the classics too have we called in many ways and under the scholar's guidance of Dean West, have symbolized the debt of science by carving high and clear across our marble front immortal words of Aristotle.

The landscape architecture of Charles Downing Lay has framed our picture. Rarely if ever have decorators' fingers so adorned and emphasized result as have Miss Hildreth Meiere's our soaring dome.

Rarely if ever have sculptor's hands wrought marble, bronze and copper with such historical insight and compelling genius, as have Lee Lawrie's in his doors and panels and other masterpieces here.

We feel with deep emotion that rarely if ever has master architect contrived so ravishing a whole as Bertram Grosvenor Goodhue; such assembly rooms, great scientific library, office, exhibit and board rooms and practical appurtenances, all so effectively and conveniently, with such power and fascinating beauty, and lovely charm carved out of space in a way to make life through beauty happier for us all—happier but for his sad loss three days ago. His thing of beauty is indeed a joy forever. It will live on, its loveliness increasing.

But I must pay one further tribute. If there should be removed from our fair project, from its scientific ideals and beneficent usefulness to the American people, the part it owes to the gifted vision and tireless devotion of George Ellery Hale, our temple could not stand.

Mr. President, this building is more than a building. It is a great instrument, firing the ideals of science as well as feeding its resources, a great organ for the taking of that divine fire which Prometheus first stole, preserving its sacred continuity and transmitting its infectious blaze throughout the land for the benefit of the people.

It is a temple indeed, a temple—as written above us—forever conscious of "ages and cycles of nature in ceaseless sequence moving"—a temple dedicated to our passion—to "Science, Pilot of Industry, Conqueror of Disease, Multiplier of the Harvest, Explorer of the Universe, Revealer of Nature's Laws, Eternal Guide to Truth."

APRIL 28, 1924

THE HISTORY OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

III

MEMBERSHIP

To the year 1915 the statistics of membership and registration have been published in the Proceedings. In 1848, the number of members was 461. Of this roll 21 were designated as from 1840, including three deceased. Of the total list less than 30 can now be recognized as geologists, although most naturalists of that time knew their geology. In 1876 only 43 names of the original 461 remained on the list, and James Hall was the only one with continuous membership from 1840.

The membership had risen to 1,004 at the first Washington meeting, in 1854. Then it fell away during the civil war period, dropping to 415 in 1867. Rising slowly, the number reached 1,030 in 1879, and 2,033 in 1883, and remained near that figure to 1900. Then the membership increased steadily to 4,000 in 1903, 8,000 in 1910, and over 11,000 in 1920.

The rapid increase during the last decade has been coincident with the publication of the Proceedings in SCIENCE as the official medium of the association; and since 1902 with the meetings in winter instead of in summer. Other and less apparent influences are the affiliation of practically all the national scientific societies; the constant watchfulness and supervision of the policy committee (now executive committee); and especially the keen and active interest of the editor of SCIENCE.

The "objects and rules of the association" recognized in the early years two classes of members: first, those who had participated in the meetings 1840–1848, along with persons of certain scientific professions who should subscribe to the rules; and second, persons who might be nominated and elected. This distinction between professional and non-professional members has continued to the present time, the workers in science being classed as "fellows" since the revision of the rules in 1874 (23: 167).

In 1857 a class of "associate members" was established, to be admitted for one, two or three years by election, the same as regular members, and to pay the

same dues, but with no participation in the business of the meetings. This complicated rule and arbitrary distinction was not lasting; but associates for a single meeting have always been recognized (by-laws, II, 2).

In 1891 the class of "corresponding members" was created (40: 442), but has been dropped. And the former class of "patrons" is now known as "sustaining members." Our democratic régime makes only a very slight distinction in privilege between fellows and ordinary members, only the former being eligible to the council.

Some careful details in the old volumes of Proceedings are now curious for published records. Several volumes contain lists of persons who "paid the assessments but were not formally elected, and did not sign the constitution," and of those who "signed the constitution but were not elected, and did not pay the assessment." Perhaps this was the secretary's method of notifying delinquents.

We do not know when the signing of the constitution was waived or forgotten. Such evidence of adhesion was the general custom of ancient societies, but, of course, impractical with large membership.

At the first meeting, 1848, a resolution was voted that members might introduce ladies at the sessions. After this gracious concession to feminine curiosity women are not recognized in the records until 1858. At the 12th meeting, in Baltimore, the standing committee proposed some changes in the rules, one of which was to admit ladies as associate members. The only subsequent mention of the proposed amendments is a sentence in volume 13, page 364, which reads, "Resolved, that no action is necessary in regard to the motion to admit ladies as members, inasmuch as two ladies have already been admitted." Examining the former lists of members it is found that in 1850 two women were elected, or at least named on the roll, Maria Mitchell, Nantucket, Massachusetts, and Margaretta Morris, Germantown, Pennsylvania. Either the two women had been very quiet for eight years or else the standing committee was not alert. In Professor Chester Dewey's personal copy of volume 12 is found a memorandum in his writing stating that the proposals of the committee had been rejected as result of opposition led by himself. The first women members in the British association were in 1843, the twelfth meeting.

An interesting list of members who had joined previous to 1877, and were then living, is printed in SCIENCE, Vol. 42, pp. 791–2, 870.

Dues.—The geologists' association had no fixed fees or dues, but assessments and voluntary subscriptions from the members present at the meetings. During the first two years of the association the rules called for an "annual subscription" of one dollar, which entitled the member to a copy of the Proceedings, and an amount on registration that was left blank in the printed rules.

In 1850 an assessment of three dollars was levied on each member in attendance; in addition to the annual dues of one dollar. We would suppose that this should have penalized attendance. But in 1851 the annual dues were two dollars, and they remained at that figure down to the revision of the rules in 1873, when the dues were made three dollars and remained at that rate until 1920. A proposition in 1891 to increase the dues to five dollars was rejected, and unwisely. Such increase was made in 1920, with practically no objection, but with increased respect for the association and greatly increased resources.

The fellowship fee of two dollars was dropped in 1904.

OFFICERS

The lists of all past officers, including those of the parent society, have been repeated in the Proceedings volumes.

The first elected president was William C. Redfield. The last presiding officer of the geologists and naturalists was W. B. Rogers, who acted in place of Amos Binney, deceased. Rogers presided on the first day of the 1848 meeting until the rules were adopted and the present association formally organized, and by action of the association his name is coupled with that of Redfield as the first presidents.

The office of permanent secretary was established in 1850, for term of three years, with a salary of $300, and Spencer F. Baird elected to office. The records show that the association immediately found a great variety of duties for the new officer with the princely salary. The office was not named in the printed rules until 1856. The previous secretaries had been E. N. Horsford and Lewis R. Gibbes. The successors to Baird have been Joseph Lovering, 1854–1868, 1870–1873; F. W. Putnam, 1869, 1873–1898; L. O. Howard, 1898–1920, and Professor B. E. Livingston since 1920.

For many years the salary of the permanent secretary was $500. During the years it was slowly raised, until in 1903 it was $1,500, with $1,000 for assistance. Honor should be paid to Miss C. A. Watson, who was Professor Putnam's efficient assistant, and to whom the association owes a debt for the many years of devoted and intelligent service.

The office of general secretary came into the rules with the changes of 1856. The chairman of the sections have always been vice-presidents of the association.

The only woman official of the association was Mrs. Erminnie A. Smith, who was secretary of the section of anthropology in 1885, the thirty-fourth meeting. This conservatism does not equal that of the British

association, which did not have a woman in office until the eighty-third meeting, 1913, as the sectional president in botany, and a woman in the council in 1914.

The list of 69 presidents of the association is the roll of honor in American science. This roll is called in each volume of the Proceedings. The titles of the presidential addresses, with volume reference, should be published ni the record of the seventy-fifth anniversary.

Brief biographical sketches, with portraits, of the earlier presidents was given by Marcus Benjamin as his address to Section I in 1889 (48: 397–459). A complete collection of portraits of the presidents to 1920, collected by him, is now the property of the association, and should some time decorate the association's hall of fame.

PUBLICATIONS

The record of 73 meetings, to 1921, is found in 62 volumes of Proceedings. A volume was published for each meeting to 1905, making 55 volumes to that date. Since then, under contract with SCIENCE as the official journal of the association, three volumes of Summarized Proceedings have been published (1912, 1915, 1921), bearing the serial numbers of the meetings, with references to SCIENCE for all administrative and scientific proceedings.

The volume published in 1843 by the parent society might properly be regarded as the initial volume of the Proceedings, but is not so listed. That "report" of the first three meetings of the geologists' association has 544 pages, 68 being "Proceedings" and 448 being "Transactions," the latter including 24 scientific papers with 21 plates. This volume was printed through the liberality of the men of Boston, and was dedicated to Nathan Appleton. The committee of publication was H. D. Rogers, L. C. Beck, B. Silliman, Jr., Amos Binney and A. A. Gould.

The early Proceedings were published in the *American Journal,* and only there do we find the record for the five later meetings of the parent society (see above in first chapter).

Volume one of the Proceedings was reprinted in 1874; and volume two in 1885. In 1882 there was a fund raised by subscription for reprinting, with a report that the Nashville and St. Louis volumes had been reprinted. The names of subscribers to the fund of $2,113.46, were given (31: 641). Evidently the officers in the early years did not anticipate the future growth of the association and the demand for its Proceedings; a common failing.

Some of the early volumes were financed by the cities which entertained the meetings. This example was set by Charleston, South Carolina, in 1850, for volume three; and followed by Cincinnati, 1851, and Albany, the same year. Cleveland undertook the publication of volume seven, for 1853, but the product was unfortunate, and was discarded, and the volume was printed by the association in 1856. An appendix to that volume tells the story in very sharp and amusing correspondence.

Judged by modern standards the early volumes were not good examples of book-making. The first six volumes have no table of contents; and numbers one and three have no index. Later volumes have sufficient, and sometimes very full contents, but the indexes are scanty.

In 1872 there was a proposition to publish a general index, which, unfortunately, was never done. The record of American science to 1903 is largely contained in the 52 volumes of Proceedings, but the lack of general indexes makes the record inconvenient and practically unavailable, and in consequence the association has not received its due credit.

In volume five we read that efforts were made to obtain abstracts of papers; repeated at times, and even made a requirement. That difficulty was not limited to those years. The trouble in obtaining reviews or summaries of scientific progress was illustrated in 1852 (7: 273), when twelve men were made as many special committees on the progress in that number of branches of science. The list was carried in several volumes, but no reports are recorded.

The only publication of the association beside the volumes of Proceedings is the Memoir on Fossil Butterflies, by S. H. Scudder, a handsomely printed quarto of 99 pages and 3 plates. The expense was borne by the first gift, of $1,000, from Mrs. Elizabeth Thompson.

During the early years the addresses by the presidents apparently were informal, and not supplied for publication. The first published address was by A. D. Bache, in 1851 (6: XLI–LX), in which he discussed the progress of the sciences. He found that 338 communications had been presented to the first five meetings; 107 in physics and mathematics; 93 in geology and mineralogy; 83 in natural history (especially zoology); 32 in chemistry, and 23 unclassified. He also made the comparison that at Cambridge and New Haven physico-mathematics predominated; natural history at Charleston; and geology at Cincinnati. Regarding the function of the association he claimed "that the association was for the advancement or increase of science, not for its diffusion or promotion." This was an overemphasis on research, and was overruled by the first article (objects) in the constitution. Diffusion of knowledge certainly is an important means of advancing it.

In 1854 President Benjamin Peirce, at Washing-

ton, made a poetic and literary address (8: 1–17). J. D. Dana's address, in 1855, was an essay on geology. (9: 1–36). At the eleventh meeting, Montreal, 1857, James Hall, as president, made an important address on the geology of the American continent, which was so far in advance of the thought of his contemporaries that it aroused strong opposition and failed of its proper influence by delay in publication, not appearing until 1882, in volume 31. Volume 13 contains the address on astronomy by Alexis Caswell. Since 1867 the address of the retiring president has been a regular feature of the meetings and a valuable part of the Proceedings volumes. They often have been of a philosophic character, and sometimes in the nature of a preachment.

Probably the more valuable element in the association literature is the many addresses by vice-presidents, as chairmen of sections, being more largely scientific reviews and technical reports by experts in their respective fields.

In 1900 a contract (49: 382) was made with the journal SCIENCE, for publishing the notices and Proceedings of the association, beginning January, 1901: and that relation has continued to the present time. In consequence the volumes of Proceedings have been abridged and united. Volumes 50–54 contain the addresses and titles of papers presented to the sections, beside the usual historical and personal matter; but since 1907 the volumes contain no scientific matter, but refer to SCIENCE. Volume 58 is the first of the greatly abbreviated volumes.

To Dr. J. McKeen Cattell, as editor of SCIENCE, and for his keen, untiring and vigilant interest in the association affairs, joined with his intimate knowledge of scientific men and forces, the association is very greatly indebted.

The publications of the great technical societies now carry most of the literary product of research and discovery. In the former years, to about 1888, the association shared with the *American Journal of Science* the responsibility of setting forth the new truth. With the vastly increased output of scientific literature it certainly is to the advantage of the student to have the literature in his field collected in the journal of the special society.

Library.—Until 1896 the literature received in exchange for the association Proceedings was held at Salem, Massachusetts, at the office of the permanent secretary. In 1895 it included 638 bound volumes, 1,628 unbound, and 6,443 pamphlets. At that time the "exchanges" numbered 248. In that year the council decided to deposit its library with the University of Cincinnati (44: 399), under a contract retaining ownership and with power to recover under conditions. At the present time data are not obtainable regarding the increase and size of the library, which is especially valuable in its series of publications by many foreign societies.

The British association has a similar disposition of its library; the foreign material being in the University College, London, and the transactions of the local societies in the British Museum.

SCIENTIFIC WORK

The scientific record may properly, if not technically, include the volume of 1843, described above under publications. The 24 papers, with 21 plates, printed in that report of the first three meetings of the geologists' association, cover a variety of subjects and are highly creditable to the earth-science of that time. They read quite up-to-date and might be examined to-day with some profit, especially for appreciation of the pioneers. There has been repetition in scientific literature, due either to ignorance or to disregard of previous work. Professor J. J. Stevenson has said, not wholly facetiously, that it is safe to republish, as original, anything 20 years old.

To 1905 the scientific activities of the association are on record in the 57 volumes of Proceedings. Subsequently they are in SCIENCE.

The first meeting is of particular interest. During the five days of the meeting the papers were presented in several general sessions and in two sections. Louis Agassiz was the first chairman of the Natural History section, and Joseph Henry of the General Physics. The record in Volume 1 is not clear, but the 56 titles listed in the *American Journal of Science* (6: 393–5) classify as follows: geology and paleontology, 12; chemistry, 11; zoology, 11; mathematics and astronomy, 8; meteorology, 3; archeology, 2; and one each in nine branches. All the men who at that time were eminent in American science attended that initial meeting. Agassiz is credited with 11 papers. At the third meeting he presented four, and at the fourth meeting 15.

Some of these papers of 1848 are interesting now. The longer were: "The sediment of the Mississippi River," by Andrew Brown and M. W. Dickeson; "Organization of the Smithsonian Institution," by Joseph Henry; and a long report on geographical explorations and researches in 1847 and 1848. An "extended and spirited discourse" by W. B. Rogers was not printed.

That old friend of the paleontologist, *Triarthrus Beckii,* was introduced and vouched for by Ebeneezer Emmons. The "Locke Level" in common use by engineers and geologists was described and figured by its inventor, Professor John Locke.

The function of the association as the watchman and spokesman for American science was properly exercised, and the young society assumed its author-

ity as representing organized science and boldly addressed communications advising national officials and state legislatures. One memorial was sent to the President, the heads of departments and to Congress requesting that scientific men be added to the boundary commissions and expeditions. Over this there was a lively debate, Agassiz in opposition. Another communication was addressed to the secretary of the navy, asking for aid to Lieutenant Maury in obtaining information for his charts of winds and currents, and another to the legislature of Pennsylvania urging the publication of the Rogers' Geological Survey report.

At the second meeting several state legislatures were advised in regard to their surveys. A few of the memorials, selected quite at random, will show the activity of the young society.

1851, to the governor and legislature of New York, with reference to a geographical survey.

1858, on the Hayes expedition to the Arctic region; on American ethnology; and to the states on meteorologic observations.

1869, the United States government was asked to intercede with the authorities of Uruguay to recover manuscripts on Indian languages for Porter C. Bliss.

1875, to Congress in support of the international bureau of weights and measures.

1878, to Congress and to state legislatures on forestry.

1881, to create the International Park at Niagara Falls.

1884, for a geodetic and topographic survey of the public domain.

1885, on the scientific work of the U. S. coast survey.

Special Committees.—The character and scope of the scientific work is also exhibited by the titles and reports of the many special committees. Eleven such committees are named in volume 2; 23 in volume 4; and 20 in volume 6. Following are a few examples:

1849, on standards of measurements; and on the prime meridian.

1858, on state surveys; on registration of births and deaths.

1859, a long report on the Coast Survey, by F. A. P. Barnard.

1875, on weights and measures, and coinage.

1876, to arrange for a congress of geologists at Paris. (This action, initiated by Section E, resulted in the organization of the International Geological Congress. The report of the committee was made in 1879, vol. 28: page 555.)

1877, elaborate report on zoological nomenclature (26: 7–56).

1880, on forestry; on science teaching in the public schools.

1881, on standards of stellar magnitude; on standard time; on abuse of the Ph.D. degree (30: 373–377).

Since the eighteenth century there has been change in the accepted view of the function of government. The opinion held by some publicists that the government should be little more than a police force has given way to a more generous conception of the duties of a people's rule. To-day, the government, both national and state, is active in many ways for the common good. The several scientific bureaus, with elaborate organization and ample financial support, are objects of just pride. In 1848 the Coast Survey was the only scientific bureau at Washington. The association must be credited with much of the social progress in America by way of development in the governmental scientific activities. To-day the association must guard against political and local injustice and organized commercial greed, and as the recognized national voice of science it should not hesitate to speak.

Sections.—For many years, down to 1881, the work of the association was carried on in two main sections, with vice-presidents. The papers were grouped in variable sub-sections, under chairmen. The present system of lettered sections went into effect in 1882, with nine sections. The first listing was in volume 30. They were increased to 12 by 1919, and the present rules name 16 sections.

The order in time in which the branches of science were recognized as sections, or sub-sections, is of interest. The nine sections in 1882 were: A, mathematics and astronomy; B, physics; C, chemistry; D, mechanical science; E, geology and geography; F, biology; G, histology and microscopy; H, anthropology; I, economic science and statistics.

In 1885 G was united with F; and in 1893 F was divided into F, zoology; G, botany. In 1901 Section K, physiology and experimental medicine, was added. With some changes in titles this schedule lasted until 1920, with the addition of L, education, in 1908, and M, agriculture, in 1914, the sixty-sixth meeting.

That the broad and fundamental science of agriculture should be the latest one recognized for separate status is a phenomenon in psychology. It was rejected in the British association in 1839, and not listed until 1912, the eighty-second meeting.

The new constitution, 1920, gives a more logical classification or sequence to the sections, and increases the number with some changes in the lettered designation. The new sections are D, astronomy; I, psychology; L, historical and philological sciences; O, agriculture; P, manufactures and commerce.

Financial.—The small income during the early years, derived only from the low membership fees, was used in economical administration and for publication of the Proceedings. Not until 1869 was there any positive action for a permanent fund. There are suggestions in the record that the prevailing policy

might have been opposed to any accumulation of property and money; for one reason that the association was migratory and without fixed habitation.

In 1869 a resolution was adopted that receipts from sales of the Proceedings should be made the nucleus of a research fund. To this small beginning was added later the life-membership fees, subsequent to the death of the life members. In the absence of donations the permanent fund grew slowly. In 1882 it was only $2,062.00; in 1891, $5,254.00; in 1910, $21,300.00. Due partly to the generous bequest of Richard T. Colburn the fund is now nearly $138,000.00.

The first notable gift was in 1873, from Mrs. Elizabeth Thompson, of $1,000.00 (22: 422). From this donation was published the memoir on Fossil Butterflies, by S. H. Scudder (23: 48). In 1884 Mrs. Thompson made a second gift of the same amount, to be used for experimental research on light and heat (33: 691). In 1911 Mrs. Jane M. Smith gave $5,000.00, the income to be used in payment of life membership fees for worthy old members. A donation of $4,381.21 was received in 1920 from W. H. Stephens.

The first grants for research from the permanent fund were made in 1887, of $175.00 to A. A. Michelson and E. W. Morley to aid in establishing a standard of length; and $125.00 to C. S. Minot for biologic study (36: 355). A third grant was made the next year to F. W. Putnam, of $200.00, for exploration of the Serpent Mound in Ohio. For several recent years the annual appropriation for grants has been $4,000.00, which in future years will be increased. However, it will require some time for our total of grants to equal that of the British association, which during the years 1834 to 1921 were an equivalent of nearly $403,000.00.

To-day the British association is suffering, only temporarily, it is hoped, from the monetary and political troubles of Europe. The outlook for the American association is bright, for financial resources and the ability to aid in the search for truth, and in helpfulness in other ways for human betterment. Other strong organizations, beside the technical societies, are now supporting scientific research; but with its honored history, its wide scope, its close relation to all the national societies and with its increasing membership and income, the association should hold its leadership in the field of American science.

In comparison with its sister associations of Great Britain and France, and others in the southern hemisphere, the American association has the peculiar difficulty and the delicate function of being the central and unifying body among a great number of very strong national societies. In further comparison, it may be said that the British association is older, richer and with great social and official prestige. Its home field is small and easily covered. It has been the chief national society, with the support of many strong local societies. The American society, on the contrary, has an immense territory, with cities far-scattered and thousands of miles for travel; no official or governmental relations; and since about 1888 has had to recognize a great number of very strong technical national societies. Our nearest approach to official recognition was the address of welcome at the third Washington meeting by President Taft; and the receipt of a communication on national conservation, in 1907, from President Roosevelt.

The annual "conferences" which the British association holds with the local societies are scarcely to be compared to the "convocations" of the American association in affiliation with (at present) 53 leading technical societies and some 40 associated societies (1921, Vols. 24–26).

The object of the association is to bring forth truth and to set forth the truth—to discover and to proclaim the phenomena of the cosmos. The educational function, the advancement of science by diffusion of knowledge, has not been undertaken in an active and systematic way. And the need is pressing for popular and general scientific education. Not only are many millions of people in this land of education ignorant of elementary science, and being served with sensation instead of fact, but to multitudes the theories and facts of science are repugnant. The truth has great need of fearless champions, and as the spokesman for organized science in America the American association should assume leadership.

HERMAN L. FAIRCHILD
UNIVERSITY OF ROCHESTER

ERNEST FOX NICHOLS

SURROUNDED by friends and associates and addressing, as one of the leaders in his own field of science, a distinguished audience of fellow scientists, Ernest Fox Nichols died suddenly on April 29, in the auditorium of the building of the National Academy of Sciences at Washington.

Were it possible to be unmindful of the added shock and sorrow to his family which such sudden death brings, his friends could have wished for him no more fitting ending of his life, devoted as it was to the advancement of scientific knowledge, than to die in full mental vigor, in physical health as it seemed, and to the very last instant taking the part of a leader in his profession.

Ernest Nichols was born fifty-four years ago and received his collegiate training in his native state, Kansas. As a graduate student in physics he began his career at Cornell University from which institu-

tion he received the doctorate of science in 1897 after having spent two years at Berlin where he completed his first important piece of experimental work. Unlike the majority of foreign students in Berlin in those days, Nichols worked on a problem of his own devising. He appeared older and more experienced than most of his fellow students in the laboratory, though he was not yet twenty-five years old, and his assiduity and his patience in overcoming great experimental difficulties was amply rewarded by his producing a very fine piece of work. This first important research of his was the study of the optical properties of quartz in the infra-red region of the spectrum and the results which he obtained led directly to the perfection of the so-called method of residual rays which has been used with conspicuous success by Rubens and his fellow workers in investigating the extensive infra-red spectrum. Before he left Berlin at the end of his second year, Nichols had published important papers in collaboration with Rubens and he was regarded both in Europe and America as an experimental physicist of extraordinary ability. In the course of the next ten years he held successively the positions of professor of physics at Colgate, Dartmouth and Columbia, and during this period his research work was largely directed towards the experimental verification of certain predictions of the dominant electro-magnetic theory of light. One of these predictions, that a beam of light should exert a minute pressure on an object in its path, had been looked for without success until Nichols, in collaboration with Hull, in America, and Lebedew in Russia, independently discovered and measured this minute effect and found it to be in accord with the theory.

In 1909 he gave up for a period of seven years his chosen field of work to become president of Dartmouth College. Throughout this period, embracing as it did the best years of his professional life, he cherished the hope that he might return to the life of productive scholarship which he had had to abandon in assuming heavy administrative duties. In 1916 he went to Yale as professor of physics, but his hopes of leisure for research in pure science were not to be fulfilled, as the approaching entry of America into the world war made it necessary to organize the scientists of the country for research and invention along lines having immediate practical value in war. Dr. Nichols was among the first to offer his services to the government through the National Research Council which he had helped to organize, and he was an active member of the group engaged in the study of antisubmarine defense in the early part of the war and was connected with the department of Naval Ordnance during the entire period of America's participation in the war.

In 1920 he became the director of research in pure science in the laboratory of the National Lamp Works in Cleveland, a position which, but for a short period of time, he occupied until the time of his death. In 1921 he was inaugurated president of the Massachusetts Institute of Technology, but owing to serious ill health was unable to continue in office for more than a few months.

Of the thirty years between the publication of his first important paper and his death, about one third was devoted to purely administrative work and this period was that during which discoveries of the most far reaching importance to physics were being made. When Nichols returned to experimental investigation, he felt that he had almost to learn his own subject over again, and he told many of his friends that it seemed to him that he should never regain a firm grasp of it. He did this, however, in spite of delicate health, and in the end was contributing regularly to the physical journals and reading papers before the American Physical Society and the National Academy of Sciences. His modesty with regard to his own place in American science was so great that one wishes he might have known what was to happen at his death: that the most distinguished gathering of his fellow scientists of America were to stand uncovered, bowed and sorrowful, at the tragic loss of an honored colleague as his dead body was born through their ranks.

AUGUSTUS TROWBRIDGE
PRINCETON UNIVERSITY

SCIENTIFIC EVENTS

RESOLUTIONS IN MEMORY OF JOHN M. STILLMAN

THE California Section of the American Chemical Society has passed the following resolutions on the demise of John M. Stillman:

WHEREAS, In the death of John M. Stillman the California Section of the American Chemical Society has suffered the loss of a loyal, distinguished and much loved member, and

WHEREAS, The members of the section were for many years inspired by the messages that he conveyed to them in meetings of the society, and in the class-rooms of the University of California and of Stanford University, and

WHEREAS, The passing of Dr. Stillman has deprived our profession of an earnest and skilful worker and valued contributor to chemical literature, and

WHEREAS, We are deeply thankful that it has been our privilege to have known him as teacher, colleague and friend; therefore, be it

Resolved, That the California Section of the American Chemical Society share with the members of the family of Dr. Stillman their sorrow. The society extends to them heartfelt sympathy; and be it further

Resolved, That this resolution be spread upon the minutes of the John M. Stillman Memorial Meeting held on February 29, 1924, and that a copy be sent to the secretary of the society, Washington, D. C.

EXPEDITION TO MEXICO OF THE NATIONAL GEOGRAPHIC SOCIETY

THE National Geographical Society will send an expedition to Mexico to uncover the oldest structure yet found on the American continent. The ruins of Cuicuilco, south of Mexico City, have been called the Pompeii of the Western World. They have disclosed an artificial mound 412 feet in diameter and 52 feet high, according to observations made by Professor Byron Cummings, leader of the present expedition. Skeleton remains of the Americans of 7,000 years ago, specimens of their emblems and idols and pieces of their earthenware were found at Cuicuilco by Dr. Cummings.

The mound was sealed and preserved by lava from the Crater Xitli. The Aztecs of Mexico were preceded by the Toltecs, and the Toltecs were preceded by a primitive people whose traces were embalmed in lava. But the volcanic forces in the Valley of Mexico have performed a more amazing feat of preservation than did Vesuvius at Pompeii, for under the present surface blanket of lava, known as the Pedregal, there is another and much earlier lava blanket. It is this earlier lava flow which encases the relics of Americans of 8,000 years ago, and which, it is hoped, will disclose remains of a civilization that existed even before the primitive predecessors of the Toltecs invaded the historic valley. The lava-covered plain known as the Pedregal, or Stony Place, is 15 miles in length and about 3 miles wide.

The expedition will begin work early in June, with the aid of three assistants, and peon laborers provided by the Mexican government. Nelson H. Darton, of the U. S. Geological Survey, will join the party later to make a special study of the lava flow and thus determine the precise age of the ruins.

ACTIVITIES OF THE ROCKEFELLER FOUNDATION

ACCORDING to a summary issued by the Foundation during the year 1923 the International Health Board, the China Medical Board and the Division of Medical Education of the Rockefeller Foundation:

Supplied fellowship funds for 636 individuals in 29 different countries;

Supported through the League of Nations interchange institutes for 54 public health officers from 27 nations;

Arranged international visits of one commission and of 24 visiting professors;

Furnished emergency relief in the form of medical literature or laboratory equipment and supplies to institutions in 15 European countries;

Sent scientific materials to Japan after the earthquake and invited a group of Japanese medical scientists to use the laboratories of the Peking Union Medical College as guests of the institution;

Continued to contribute to schools or institutes of hygiene at Harvard, London, Prague, Warsaw and Sao Paulo, Brazil;

Cooperated in nurse training at Yale University and in France, Belgium, Brazil, China and the Philippines;

Accepted an invitation from Brazil to participate in a comprehensive attack upon yellow fever;

Had a share in demonstrations of malaria control in 12 American States and conducted malaria surveys or studies in the United States, Brazil, Australia, Nicaragua, Porto Rico, Salvador, the Philippine Islands and Palestine;

Either continued or began antihookworm work in conjunction with 20 governments in various parts of the world;

Contributed to 183 county health organizations in the United States, New Brunswick (Canada) and Brazil;

Continued a study of the medical schools of the world by visits to Belgium, Austria, Czechoslovakia, Germany, Hungary, Poland, Turkey, Hongkong, the Straits Settlements, Siam, Canada, England, Scotland, Wales, the Netherlands, Mexico and Colombia;

Offered to contribute 280,750 pounds sterling to the development of medical education in certain universities in the British Isles;

Gave $500,000 to the University of Alberta, and pledged $250,000 to the University of Pennsylvania toward buildings for anatomy and physiological chemistry;

Continued to support a modern medical school and teaching hospital in Peking;

Aided two other medical schools and 25 hospitals in China;

Assisted premedical education in several institutions in China and agreed to do this also in Bangkok, Siam;

Lent representatives to governments and institutions for various types of counsel and service;

Continued to support a disease reporting service of the Health Section of the League of Nations;

Contributed to mental hygiene projects, demonstrations in dispensary administration, organization of dispensary work in France, and to other undertakings in the fields of public health and medical education.

THE PENNSYLVANIA ACADEMY OF SCIENCE

THE Pennsylvania Academy of Science was organized at a meeting held in Harrisburg on April 18. Representatives of the faculties of various universities and colleges, officials of certain state departments and high-school instructors adopted a temporary constitution and elected officers for the current year. The aim of the organization, according to the constitution, is to "promote scientific research and the diffusion of

knowledge concerning the various departments of science; to promote intercourse among men engaged in scientific work, especially in Pennsylvania; to assist by investigation and discussion in developing and making known the material, educational and other resources and riches of the commonwealth; to arrange and prepare for publication such reports of investigation and discussion as may further the aims and objects of the academy." Three classes of membership were provided for in this constitution: active, for those actually engaged in scientific work; associate, for those interested in science who are not qualified for active membership; and honorary, for those who have attained special prominence in science. A meeting will probably be held in November and an annual meeting next spring. Officers for the academy were elected as follows:

President: Dr. O. E. Jennings, University of Pittsburgh.

Vice-president: Dr. C. E. McClung, University of Pennsylvania.

Secretary: Mr. Joseph Illick, State Department of Forests and Waters.

Assistant Secretary: Dr. T. L. Guyton, State Department of Agriculture.

Treasurer: Dr. Frank D. Kern, Pennsylvania State College.

Editor: Dr. George H. Ashley, state geologist, Department of Forests and Waters.

Press Secretary: Mr. J. P. Kelly, Pennsylvania State College.

The executive committee is to consist of the officers and former presidents. Since there are no former presidents to serve, the following names were added to the executive committee: Dr. J. B. Miller, Lehigh University (4 years); Dr. W. V. Bingham, Carnegie Institute of Technology (3 years); Dr. John A. Miller, Swarthmore College (2 years), and Professor S. H. Derrickson, Lebanon Valley College (1 year).

JOHN SCOTT MEDAL AWARDS

AT a special meeting of the American Philosophical Society held on Friday, May 2, the City of Philadelphia through its Board of Directors of City Trusts made the annual presentation of the John Scott Medal Awards as follows:

TO FREDERICK G. BANTING, M.D., physiologist, of London, Ontario, who in 1920 and 1921 succeeded in preparing a potent extract of the experimentally atrophied pancreas; a condition produced by ligating the pancreatic duct. The injected extract increased materially the life of depancreatized dogs by enabling them to retain larger amounts of sugar. In these researches there were associated with Dr. Banting, Drs. Macleod, Best and Callip.

TO WILLIAM W. COBLENTZ, Ph.D., physicist of the U. S. Bureau of Standards, for his unsurpassed skill in the design and construction of thermopiles and radiometers of the highest sensitivity with which he has actually measured the radiation of the fainter stars.

TO ELMER VERNER MCCOLLUM, Ph.D., Sc.D., professor of biochemistry, School of Hygiene and Public Health, Johns Hopkins University, who demonstrated in 1913 a growth promoting vitamin in butter fat, the first of a long series of researches by him and his collaborators on the presence in various foods of other similar substances, promoting growth and maintaining health.

TO RALPH MODJESKI, D.Eng., of New York City, for his skill in bridge designing, having designed and built the Columbia and Williamette River bridges in Oregon, the McKinley bridge at St. Louis, the Broadway bridge at Portland, Oregon, the Cherry Street bridge at Toledo. He is now chief engineer of the Delaware River bridge.

SCIENTIFIC NOTES AND NEWS

AT the meeting of the National Academy of Sciences held in Washington on April 30 new members were elected as follows: Arthur Byron Coble, University of Illinois, mathematician; Charles Edward St. John, Mt. Wilson Solar Observatory, astronomer; Harlow Shapley, Harvard College Observatory, astronomer; Karl Taylor Compton, Princeton University, physicist; Arthur Becket Lamb, Harvard University, chemist; William Crowell Bray, University of California, chemist; Frederick Belding Power, Bureau of Chemistry, chemist; Andrew Cowper Lawson, University of California, geologist; Charles Elmer Allen, University of Wisconsin, botanist; Lorande Loss Woodruff, Yale University, zoologist; Stanley Rossiter Benedict, Cornell Medical College, physiological chemist; Frederick George Novy, University of Michigan, pathologist; Hans Zinsser, Harvard Medical School, bacteriologist; George Sumner Huntington, Columbia University, anatomist; Raymond Dodge, Wesleyan Univresity, psychologist.

MEDALS of the National Academy of Sciences have been presented as follows: The Agassiz medal to Otto Sven Pettersson, of Sweden; the Henry Draper medal to Arthur S. Eddington, of the University of Cambridge; the Watson medal to C. V. L. Charlier, of Sweden; the Daniel Giraud Elliot medal, for 1921, to Bashford Dean, of Columbia University; for 1922, William Morton Wheeler, of Harvard University, and for 1923, to Ferdinand Canu, of Versailles, France.

FUNERAL services in memory of Ernest Fox Nichols were held at St. John's Episcopal Church, Washington, on the afternoon of May 3. The pallbearers, representing the National Academy of Sciences, were: Dr. George E. Hale, Mount Wilson Observatory; Professor William Duane, Harvard University; Professor M. I. Pupin, Columbia University; Dr. David Fairchild, the Department of Agriculture; Professor

Ernest Merritt, Cornell University, and Dr. C. G. Abbot, the Smithsonian Institution.

DR. ROBERT A. MILLIKAN, director of the Norman Bridge Laboratory of the California Institute of Technology, is about to sail for Sweden, where he will deliver on May 23 the lecture in connection with the award to him of the Nobel prize in physics.

DR. ELIHU THOMSON, one of the founders of the General Electric Company and director of the research laboratory at the Lynn (Mass.) works, sailed for Italy on April 26, to be gone for three months. In England he will receive the Lord Kelvin gold medal.

PROFESSOR GEORGE M. BERINGER, Camden, N. J., former editor of the *American Journal of Pharmacy* and president of the American Pharmaceutical Association, has been awarded the Remington Honor Medal of the association.

GILBERT RIGG, formerly with the New Jersey Zinc Co., is one of the joint recipients of the gold medal of the Institution of Mining and Metallurgy (London). The award was made conjointly to him and H. E. Gepp in recognition of their services to the science and practice of metallurgy, with special reference to the treatment of zinc ores and the development of electrolytic zinc in Australia.

THE President of Chile has conferred upon Wilson Popenoe, agricultural explorer of the U. S. Department of Agriculture, the decoration "Al Mérito" in recognition of his services to Chilean agriculture. This order was founded by the liberator O'Higgins, shortly after Chile gained her independence in 1818. Mr. Popenoe is the eighth North American to receive it.

FRANK B. GILBRETH, industrial engineer, of Montclair, N. J., and a member of the A. S. M. E., has been elected a member of the Masaryk Academy of Work in Czechoslovakia.

THE seventieth anniversary of the birth of Ehrlich, the distinguished pathologist, was celebrated at Frankfort, on March 14, when an address was delivered by his successor, Professor Kolle.

DR. JULIUS WATJEN, of Bremen, has been appointed director of the Pathological Institute of the University of Berlin to succeed Professor W. Ceeley.

BRIGADIER GENERAL HARRY TAYLOR, now assistant chief of the corps of engineers of the army, has been appointed chief, to fill the vacancy which will be caused by the retirement on June 18 of Major General Lansing H. Beach. He will have the rank of major general. The vacancy resulting from the promotion of General Taylor will be filled by the promotion of Colonel Edgar Jadwin to the rank of brigadier general and the post of assistant chief.

DR. L. B. BALDWIN, for many years superintendent of the University of Minnesota Hospital on a half-time basis, has accepted a full-time appointment from the regents. The change was made necessary by plans for immediately enlarging the hospital. Two units, one a cancer hospital and the other an eye, ear, nose and throat pavilion, will be erected this summer. The university has received a gift with which in about two years it will erect a hospital unit for the care of pediatric cases.

DR. ANTHONY J. LANZA has been appointed executive officer of the National Health Council to succeed Dr. Donald B. Armstrong. Dr. Lanza was for three years connected with the health organization of the commonwealth of Australia.

FRANK G. HORTON has been made assistant secretary of the Illuminating Engineering Society, succeeding the late Dr. Ralph Chapman Rodgers.

DR. H. A. GLEASON, of the New York Botanical Garden, sailed for England on May 3, and will spend three months in research on the flora of northern South America at the Royal Botanic Garden, Kew, England, and at the Museum of Natural History, Paris. He will attend the British Botanical Congress, to be held in London in July.

FREDERICK G. CLAPP, of New York, is absent on a geological exploring expedition into the heart of the Kimberley desert in the north-central part of Western Australia.

DR. MANUEL GAMIO, director of the Bureau of Anthropology of Mexico, recently visited the United States upon invitation of the Carnegie Institution of Washington and delivered two addresses in Washington on the anthropology and archeology of Mexico. These lectures were followed by conferences in which leading representatives of archeological studies in this country took part. The Carnegie Institution announces that as result of arrangements consummated during Dr. Gamio's visit, immediate steps will be taken to inaugurate its program for archeological investigations in Yucatan in accordance with agreement with the Mexican government on this subject which was reached prior to the outbreak of the Mexican revolution. The party which will take the field this spring for preliminary investigations and excavations at Chichen Itza will consist of S. G. Morley, associate in archeology; Earl H. Morris, archeologist in charge of excavations; Monroe Amsden and O. G. Ricketson, Jr., assistant archeologists.

DURING the week of April 7 to 12, Dr. Charles P. Berkey, professor of geology, Columbia University,

lectured before the Geographic Society of Chicago, the Sigma Xi Society of Northwestern University and the Union League Club of Chicago on the "Exploratory investigations of the third Asiatic expedition in the Desert of Gobi." On the tenth a lecture was given before the Dip and Strike Club of Northwestern University on "The geologic problems of the Catskill aqueduct."

PROFESSOR WILLIAM A. NOYES, of the University of Illinois, gave an address on "Positive and negative valences" at University College, London University, the University of Cambridge, the University of Oxford and Manchester University during the first week in May. The lecture was given before the French Chemical Society in Paris on February 22.

PROFESSOR A. S. EDDINGTON, of Cambridge University, after attending the meeting of the British Association at Toronto, will proceed to the University of California, where he will lecture in the department of physics during the first semester of 1924–25. He will offer a lecture course on general relativity and a seminar on problems of sidereal astronomy. He will also give a short course of popular lectures.

PROFESSOR W. L. BRAGG, of the University of Manchester, England, will give the two courses in the summer session of the University of Michigan on (a) X-ray crystal analysis and (b) Recent contributions in the field of x-rays and their interpretations. Professor Bragg will be in residence at Ann Arbor for four weeks beginning on July 14.

DEAN CONANT WORCESTER, formerly of the Department of Zoology of the University of Michigan and Secretary of the Interior of the Philippines from 1901 to 1913, since which he became manager for commercial companies in the islands, died suddenly on May 2, aged fifty-eight years.

DR. EUGENE DUPUY, formerly vice-president of the Société de Biologie of Paris and assistant to Brown-Séquard at the Collège de France, has recently died at the age of seventy-seven years. He was the author of publications on epilepsy and diseases of the nervous system.

DR. GARIEL, former professor of physics in the medical department of the University of Paris, has died at the age of eighty-three years. He had been previously chief engineer of bridges and highways, and professor of physics and chemistry at the École des ponts et chaussées.

A. L. LOVETT, professor of entomology at the Oregon Agricultural College, died on April 25, at the age of thirty-eight years. A correspondent writes: "Professor Lovett's studies of poison insecticides, spray solutions, their combinations and applications, are estimated to have saved hundreds of thousands of dollars to Oregon growers alone. He first developed the idea of using spreaders in sprays, which has been adopted all over the country, and worked out effective methods for combating European earwig, grasshoppers and other insect pests. He was known as a scientific man who made science meet the practical problems of agriculture."

THE eighty-eighth Congress of German Natural Scientific Men and Physicians and Medicine will be held at Innsbruck from September 21 to 26, under the presidency of Professors von Schweidler and Haberer. Among the papers that will be read are: Constitution and character, by Professor Gruhle, of Heidelberg; the problem of body and soul, by Professor Hoche, of Freiburg; the "speech" of bees, by Professor v. Frisch, of Breslau, and the blood and special senses of insects, by Professor Knoll, of Prague.

THE fifth national convention of Sigma Gamma Epsilon, the professional geological, mining and metallurgical fraternity, was held at Golden, Colorado, April 18 and 19, as the guest of the Lambda Chapter at the Colorado School of Mines. This organization has succeeded in arousing more vital interest of students in the work of the departments of geology, mining and metallurgy, has helped to raise the standards of scholarship in these departments, and has banded together an increasingly large, loyal and enthusiastic group of men who are worthily accomplishing the practical ends for which their training in school has prepared them. The fraternity was founded at the University of Kansas in 1915. C. E. Decker, secretary-treasurer, reported a growth in number during the past six years from four to thirteen chapters, with additional charters granted to Washington State College at Pullman and the University of California at Berkeley. There are active chapters at the universities of Kansas, Nebraska, Oklahoma, Texas, Utah, Missouri, Minnesota, Michigan, Pittsburgh and Cornell, Pennsylvania State College and at the Colorado and Missouri Schools of Mines. Officers of the Grand Council elected for the next biennium are: Charles E. Decker, president, University of Oklahoma; E. F. Schramm, vice-president, Univresity of Nebraska; C. B. Carpenter, secretary-treasurer, Colorado School of Mines; W. A. Tarr, editor, University of Missouri, and C. A. Bonine, historian, Pennsylvania State College.

WE learn from the London *Times* that the Australian Government has decided to establish a solar observatory at Mount Stromlo, in the Federal capital territory, to link up with existing institutions in England, India, America and Central European countries. The world chain of solar observatories will thus be completed. The Minister for Home and Territories,

Senator Pearce, explains that the project, which is warmly supported by the Royal Society, the British Association for the Advancement of Science, the International Solar Union, and other scientific bodies, has been under consideration for some years, but its realization was delayed by the outbreak of war. Professor W. G. Duffield, of University College, Reading, an Australian by birth, has been instrumental in obtaining two valuable gift telescopes for the proposed observatory, and also about £1,500 for the purchase of other equipment. The remainder of the equipment required, and the necessary buildings for the housing of the instruments and staff, will be provided by the Australian government, which will undertake the maintenance of the observatory. One of the results hoped for from Australia's participation in the international scheme of solar research is a better knowledge of the causes of weather changes, which, in turn, should lead to more accurate and longer-range weather forecasting. The existing Australian observatories will remain under state control.

RECENTLY there was held at the Bureau of Standards a conference having for its object the reduction of the number of sizes and kinds of paper which have been carried in stock as well as the standardization of nomenclature and testing methods. The conference was attended by manufacturers, merchants and users of paper. Six committee reports, which had been submitted to the bureau, were placed before the conference, and they were accepted unanimously as a basis for further action. A list of the standard sizes of sheets and widths of rolls was proposed and approved, and lists of sizes for each kind of paper will be submitted for approval to the industries making and using such paper. When the standard sizes are finally adopted, these sizes will be regularly carried in stock by dealers, other sizes being made to special order only. This will reduce very much the amount of stock which must be carried by dealers and will decrease their overhead charges. It will also result in a more efficient utilization of the mills and in more prompt delivery of orders of standard sizes. The users will benefit by the change as they will be able to get paper to meet their needs on much shorter notice.

Nature writes: "In his recent presidential address to the Institute of Physics, Sir J. J. Thomson gave some account of the work he saw during his recent visit to America in the research departments of some of the great manufacturing firms. These laboratories were established in the face of considerable opposition, but now the unanimous opinion appears to be that the research department is one of the most profitable in manufacturing concerns, and, however great the necessity for economy, its cost would be the last to be reduced. The scale of the laboratories is far greater than anything in Great Britain, and much of the work carried out is not merely what may be called development work, but is fundamental scientific work, worthy of a university laboratory. On the other hand, the American universities do not seem designed to produce a large number of men qualified to take up advanced research work. For example, few of the science students have the necessary equipment in mathematics, and the stern training which a good honors man in a great English university has to go through appears to be unknown. The system is doubtless good for the average man, but a successful research institute requires something more than the average man: it needs men with high scientific knowledge. In this regard, Great Britain has a distinct advantage which is sorely needed if it is to hold its own in competition."

ACCORDING to an article in *Nature*, the Imperial Russian Government in 1912 ordered from Messrs. Sir Howard Grubb and Sons, Ltd., a forty-inch reflecting telescope for Simeis Observatory, Crimea, and the preliminary designs for the instrument were made in collaboration with Dr. Belopolsky, the late Dr. Backlund and Sir David Gill. In 1922 instructions were received from the Soviet Government to complete the instrument, and it is now undergoing tests at Messrs. Grubbs's works at St. Albans. The glass mirror, 40¼ inches diameter and 8 inches thick, weighs about 900 pounds, and is mounted on a system of levers so arranged as to cause an equal pressure on 9 out of 12 portions of equal area of the lower face of the mirror, the remaining 3 portions being supported on adjusting screws for squaring the mirror. Nine weighted levers mounted on universal joints compensate for the side pressure of the mirror, these levers being out of action when the tube is vertical, and gradually coming into action as the tube is moved towards the horizontal. These systems of levers are similar to those used in the sixty-inch Mount Wilson telescope.

THE London *Times* reports that the British Ministry of Health announces that a royal charter has been granted for the incorporation of the Governing Body of the London School of Hygiene and Tropical Medicine, which is to be established as a result of the donation of $2,000,000 given by the Rockefeller Foundation for the purpose. It will be remembered that the Rockefeller Foundation in 1922 offered to provide a sum of two million dollars towards the cost of building and equipping an Imperial and International School of Hygiene (to be affiliated with London University), on the understanding that the British government should accept the responsibility of providing for staffing and maintain-

ing the school when established. The government accepted the offer. The foundation then acquired a site near Gower street. More recently Dr. Andrew Balfour was appointed director. The departments of the school for which provision is to be made include (1) Applied physiology and principles of hygiene; (2) Chemistry and bio-chemistry; (3) Immunology and bacteriology; (4) Medical zoology; (5) Epidemiology and statistics; (6) the practice of preventive medicine, general sanitation, and administration; (7) Tropical medicine (and hygiene). The school will provide for the training and equipment of public health officers, and for research in the various branches of preventive medicine, and its objects have been defined by Sir George Newman as: (*a*) To make instruction of university standard available in every department of hygiene; (*b*) to further the practice of hygiene, not only in this country and the British Empire, but in all parts of the world.

UNIVERSITY AND EDUCATIONAL NOTES

BY the will of Dr. G. Stanley Hall, president emeritus of Clark University, the bulk of his estate is left to the university for the creation of "the G. Stanley Hall Foundation, the principal to be held intact forever, and the income used exclusively for research in genetic psychology."

THE will of Dr. Theophil Mitchell Prudden leaves to Yale University $5,000 for the study of American archeology.

THE new $300,000 electrical engineering building at the University of Minnesota will be open for use in May.

PROFESSOR ROSWELL PARKER ANGIER, director of the Psychological Laboratory of Yale University, has been appointed professorial lecturer in psychology at the University of Chicago; Dr. William Talioferio, of the Johns Hopkins University, associate professor of hygiene and bacteriology; Dr. G. K. K. Link, associate professor of plant physiology, and Dr. Fay Cooper Cole, assistant professor in anthropology.

ASSISTANT PROFESSOR H. HORTON SHELDON, of the department of physics of New York University, in charge of the Washington Square Laboratory, has been promoted to the rank of associate professor. New appointments for next year include Max Petersen, Lloyd B. Hamm, T. D. Phillips, Vernon Guthrie, F. C. Farnham and J. H. Rourbaugh.

PROFESSOR C. J. LYNDE, of Macdonald College, McGill University, has been appointed professor of physics in the school of Practical Arts, Teachers College, Columbia University.

DISCUSSION AND CORRESPONDENCE

THE SPECTRUM OF HELIUM IN THE EXTREME ULTRA-VIOLET

THE investigation of the spectrum of helium in the extreme ultra-violet on which I have been long engaged and which had pretty nearly come to a standstill for want of an untarnished diffraction grating, has recently been set in motion again by the energy and kindness of Professor R. W. Wood, who has furnished me with several instruments from the engine at Johns Hopkins University. As a result I am able to make some additions to the facts already announced.

In the first place several new terms have been added to the oS–mP series whose first member lies at λ-584.4, making seven lines in all. Moreover a continuous spectrum extending from the limit of this series toward the extreme ultra-violet has been observed. This phenomenon was obtained with a disruptive discharge and its reality is subject to all the uncertainties which accompany this form of excitation. However, as this type of spectrum is of some theoretical interest its appearance is worthy of note.

Secondly, I have found two members of the first, and probably the most important, enhanced series, $4N((1/1^2)-(1/m^2))$; they occur, as they should, at λ 303.6 and λ 256.3.

Lastly, there is a new line at λ 591.5 which fits the relation oS–1π, interesting because it furnishes the first experimental evidence for radiation from helium involving a so-called intersystem combination, that is to say, a jump from a doublet energy level to the fundamental singlet level.

These results have all been checked with two or more gratings.

THEODORE LYMAN

JEFFERSON LABORATORY,
HARVARD UNIVERSITY

PORTRAITS OF NATURALISTS

PROFESSOR PIERCE'S letter in SCIENCE for April 4 (LIX, No. 1527, pp. 318–319) suggests a note which may interest readers of SCIENCE.

Many workers have collections of portraits (mostly photographic). When visiting laboratories, we frequently see large collections, framed and hanging on the walls, as notably, for example, in George H. F. Nuttall's laboratory at the Molteno Institute, Cambridge University, England. In his letter in SCIENCE, Professor Pierce speaks of the fading of photographs and the attempt which they make at Stanford to collect engravings and prints, for permanence.

For many years I have kept in my office in the Bureau of Entomology at Washington a registration

book for foreign visitors, in which I have pasted photographs taken at the time of registration. Lately, I have devised a scheme for a permanent collection which I think will be of interest.

On strong cardboards (8 by 10 inches) I have mounted the photographs, and at the top of each card is printed the name, the locality, the date, the name of the photographer, the name of the donor and the corresponding number of the negative. These mounts are then arranged alphabetically in permanent filing cases on the card-catalog system, so that they can be readily looked over. The back of each card is furnished with transverse lines for remarks which are frequently full and relate to the career of the worker shown in the photograph.

In this way I have already accumulated for the Bureau of Entomology a collection of more than 700 photographs of entomologists of all times and of all countries, and it is growing rapidly.

The advantages of the system are compactness, ready reference and practically impossible fading. The collection often includes several photographs of the same man, taken at different periods of his life, and frequently at his desk or in the laboratory.

The interest of such a collection to students and other workers is very great, as every one must realize.

Wherever possible, I have adopted Dr. Marcus Benjamin's idea, as shown in his collection of past presidents of the American Association for the Advancement of Sicence and in his other collection of bishops of the Episcopal Church, adding samples of the handwriting of the person photographed. Entomologists are urged to send me their photographs for this collection.

L. O. HOWARD

BUREAU OF ENTOMOLOGY,
U. S. DEPARTMENT OF AGRICULTURE,
WASHINGTON, D. C.

FRANK H. BIGELOW

WHEN death claims a friend the first note is personal. Dr. Bigelow was my classmate at Harvard. He entered the Episcopal ministry and was assistant pastor at St. John's here in Washington. He was also attached to the Weather Bureau and stressed the mathematical problems of meteorology. He soon realized that he was a mathematician and not a clergyman. His work became known internationally. He accepted a call from Argentina to organize the weather service of that country. He never came back to Washington. He retired at 70 and went to Vienna to continue studies in mathematical research. At the time he was in Argentina we kept up occasional correspondence. Just a short time ago he showed his customary interest in my family. He sent my boys, who are keen philatelists, some rare postage stamps. He had just spent a few weeks in Berlin, and I venture to quote a few observations on our fiftieth anniversary of the class of '73:

> In the name of old '73 I salute you again. I wish very much I could have been there to see the 36 faithful once more.[1] Their group pictures are so changed that I can hardly make out half a dozen. The names call up the fires of 50 years ago, and that is better after all. I infer that you are very well and flourishing, and I wish to send greetings to Mrs. Wiley and those two boys, wishing you all joy and happiness for their coming years.
>
> My absence from the United States is for longer than I anticipated when we sailed away in 1910. My work went on without interruption till 1921, and then I had to knock off on account of diabetes which played havoc with my eyes. Enough of them is left to make life agreeable, and with margin for some study in science, as you can see from No. 5.[2] We have been in Europe nearly three years and find more diversion here than in Washington. We have put in some 60 operas and concerts in Vienna, where music is religion. This was a wonderful experience. It is amazing to see the operas, concerts and restaurants crammed with people every day in the year. I can see no sign of poverty. We had a rousing month in Southwest Germany, in August, 1923, and I could see no sign of distress or preoccupation of any sort. Nearly all the precepts of political economy which I learned at Harvard are now in the fat, and your boys may have a try at the johnnie cakes being cooked.
>
> *Amice, vale.*
>
> HARVEY W. WILEY

WASHINGTON, D. C.

SCIENTIFIC BOOKS

Galvano-magnetic and Thermo-magnetic Effects. By L. L. CAMPBELL. Number seven of *Monographs on Physics*, edited by Sir J. J. Thomson and Frank Horton, Sc.D. Longmans, Green & Co., New York, 1923. 307 pages, 8vo.

THIS monograph brings together historical, experimental and theoretical accounts of the Hall effect, the Ettinghausen effect, the Nernst effect and the Righi-Leduc effect.

A thin sheet of metal is placed in and normal to a strong magnetic field. When an electric current flows through the sheet of metal a transverse electric potential-difference is developed (the Hall effect) and a transverse temperature difference is developed (the Ettinghausen effect). When a flow of heat takes place along the sheet of metal a transverse electric potential-difference is developed (the Nernst effect)

[1] The number of classmen attending the fiftieth reunion.

[2] He refers to his last published paper, "Atmospheric physics—as applied to a reformed meteorology," 61 pages, printed in Vienna, in April, 1923.

and a transverse temperature difference is developed (the Righi-Leduc effect).

These effects have an important bearing on the theories (electron and atomic theories) of electric and thermal conduction in metals. Important work, experimental and theoretical, has been done in this field very recently by Professor E. H. Hall (who discovered the Hall effect in 1879) and by Professor P. W. Bridgman; and Professor Hall is now able to calculate the magnitudes of the Ettinghausen, Nernst and Righi-Leduc effects from the Hall effect.

The present active interest in the theories of metallic conduction (electric and thermal) is indicated by the program which has been recently announced for the fourth International Physics Conference under the auspices of the "Institut International de Physique Solvay." This conference will be devoted exclusively to "Le mechanisme de la conductibilité metallique." Professor E. H. Hall and Professor P. W. Bridgman were invited to attend this conference which was held in Brussels, April 24 to 29.

Sir J. J. Thomson and Dr. Frank Horton are rendering important service in editing the *Monographs on Physics,* and Dr. L. L. Campbell's volume is up to the high standard of the series. It is an important piece of work well done.

WM. S. FRANKLIN

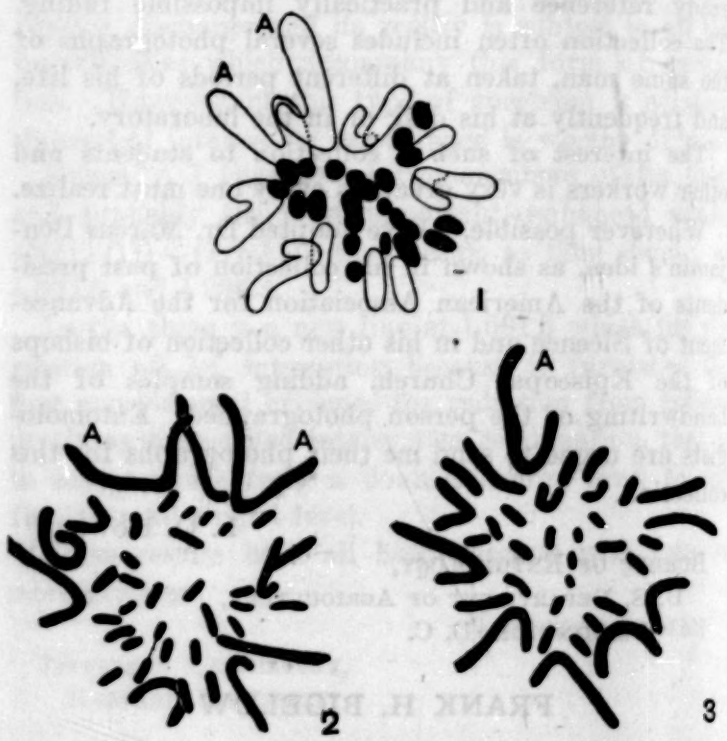
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

SPECIAL ARTICLES

THE SOMATIC CHROMOSOMES OF THE CHICK AND THEIR POSSIBLE SEX RELATIONS

SINCE 1917 observations have been carried on more or less intermittently on the chromosomes of the chick with the devotion of the writer's entire time to the subject for the last few months. As the study of the spermatogenesis will not be completed for a few months and as some interest has been shown in the results so far obtained this note was prepared to describe briefly the general cytological situation as found in the soma.

The very small size of the cells in the chick make it rather unfavorable material for chromosome study and calls for the utmost refinement in the technique used in preparing the tissues. Tissue cultures are very valuable additions to the sectioned material, as the cells in them, released from their usual confinement, become somewhat larger and flatten out markedly against the cover-glass. Owing to the extremely small size of the shorter chromosomes the total number of these bodies in the cells of the chick is difficult to determine exactly. Contributing to the uncertainty of enumeration is the tendency of the chromosomes to first appear in prophase in number considerably in excess of the metaphase count. As mitosis proceeds, the number is seemingly reduced by the union of individual chromatin particles. The number of the chromosomes found in the metaphase plate as nearly as can be determined lies between 35 and 40. The larger chromosomes of the complex are quite big enough for satisfactory observation, and a study of their size and shape relations in somatic cells, embryonic gonads and tissue cultures has shown the largest chromosome in the female to be unmated, while the chromosome corresponding in size and shape in the male is present in duplicate. Although satisfactory material for the study of the adult testes is not as yet at hand, Dr. Stevens's figures published by Dr. Boring[1] show two chromosomes of similar size and shape in the spermatogonia which correspond to the largest in my series. This indicates that the largest chromosome in the adult male cells is paired as I found it in the embryonic male gonad. Miss



Stevens's figure (No. 1), together with a complex taken from an embryonic male (Fig. 2) and female gonad (Fig. 3), is shown in the illustration. In these figures the largest chromosomes are labeled A. As is evident, they are of the same general size and shape in all the complexes. They are paired in the cells of male origin, Figures 1 and 2, while Figure 3, from an embryonic female gonad, shows but one such chromosome. The difference in the diameter of the chromosomes in Figure 1 may possibly be due to the fact that Miss Stevens frequently used aceto-carmine as fixative and stain, which tends to swell chromosomes.

If these observations are confirmed by the conditions found in the adult testes another case can be

[1] SCIENCE, N. S., Vol. 58, July 27, 1923.

added to the already large list of agreements between genetic behavior and cytological phenomena. If the analysis of the chromosomes and their sex relations as found in the soma proves correct, then the male, possessing two X chromosomes, will produce sperm of only one kind, while the female, being heterozygous for the X, will produce two types of eggs—one with and one without the X. This would agree with the genetic results obtained with the domestic fowl which has indicated these birds to be just opposite to mammals in their sex linkage phenomena.

ROBERT T. HANCE
NATIONAL RESEARCH FELLOW,
UNIVERSITY OF PENNSYLVANIA

THE WASHINGTON MEETING OF THE AMERICAN CHEMICAL SOCIETY

THE sixty-seventh general meeting of the American Chemical Society was held at Washington, D. C., from Monday, April 21, to Saturday, April 26, 1924, inclusive. The council meeting was held on the twenty-first, the general meeting on the morning of the twenty-second, special divisional meetings on the afternoon of the twenty-second, and divisional meetings on Wednesday and Thursday mornings and all day Friday. Excursions to government laboratories took up Wednesday and Friday afternoons. Thursday afternoon was enjoyed by all of the members in a mass boat excursion to Mt. Vernon. President Coolidge received the members at 12:30 Thursday. Full details of the meeting will be found in the May issue of *Industrial and Engineering Chemistry* and in the May 10th *News Edition*.

The registration was 1934 of whom 401 were ladies. In addition 200 more members went to Edgewood who did not register. This was, accordingly, the largest meeting the American Chemical Society has ever held. The general meeting on Tuesday morning was made noteworthy by two important papers; first, by Robert A. Millikan on "The atom as seen by the physicist," and second by Gilbert N. Lewis on "The atom as seen by the chemist." An audience of over 1,700 people was present.

On Tuesday evening a general reception and entertainment was held in the National Museum, music being furnished by the United States Marine Band, and on Wednesday evening the society and the public to the number of 1,700 were addressed by Edwin E. Slosson, on the subject "The expansion of chemistry." At the general meeting on Tuesday morning, S. P. L. Sorenson was elected an honorary member of the society.

A dinner dance with 300 present was held at the Wardman Park Hotel on Friday evening. The excursion to Edgewood Arsenal on Saturday was a noteworthy occasion with over 1,000 members and guests present. During the forenoon the following plants of the Chemical Warfare Service were visited: Phosphorous Filling Plant, Physical Laboratory, Toxicological Laboratory, Phosgene plant, (CO_2, CO an O_2 Plants), Phosgene Filling Plant, Ethylene Plant, Brombenzylcyanide Plant and Mustard Gas Plant. After luncheon, served at the Arsenal, a field demonstration of chemical warfare service and equipment was of particular interest to all who were present, especially the sprinkling, under the latest conditions, of an impervious smoke screen, which is considered one of the most important developments since the close of the war.

The four general programs by divisions held on Tuesday afternoon were under the auspices of the Division of Physical and Inorganic Chemistry joint with the Division of Biological Chemistry, the Division of Industrial and Engineering Chemistry, the Division of Chemistry of Medicinal Products and the Division of Organic Chemistry. All other divisions and sections held meetings with the exception of the Fertilizer Division. The Paint and Varnish Section held its first meeting with an attendance of 200, this being the largest first meeting of any section ever held. Further details of these meetings will be found in the May and June issues of *Industrial and Engineering Chemistry*.

The Council of the American Chemical Society met at the Willard Hotel, on April 21, at 2:30 p. m., with President Baekeland in the chair.

It was voted to charter a local section to be known as the Northwestern Utah Section, with headquarters at Salt Lake City, and a local section to be known as the Arizona Section, with headquarters at Tucson.

An invitation was received from the Southern California Section for the general meeting of the society to be held at Los Angeles, California, in the summer of 1925, the exact date to be determined later. The three councilors from the Southern California Section spoke of the desire of the section to have the Chemical Society come to Los Angeles, and although it was impossible, under the constitution, to definitely vote at this meeting to accept this invitation, a unanimous expression of opinion was received from the councilors present that it was desirable to hold the 1925 summer meeting in Los Angeles.

It was voted that the suggestion of the Rochester Section for the erection of an office building in Washington, D. C., as a home for the society be referred to a committee to be appointed by the executive committee, this committee to investigate the proposition and report back to the council in September.

A proposal for the election of S. P. L. Sorenson as an honorary member of the American Chemical Society submitted to the council and signed by a